F-I

King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
Math 513 Major Exam I
The First Semester of 2014-2015 (142)
Time Allowed: 120 Minutes

Name: _____ ID#: _____

Section/Instructor: _____ Serial #: _____

- Mobiles and calculators are not allowed in this exam.
- Write all steps clear.

Question #	Marks	Maximum Marks
1		
2		
3		
4		14
5		12
6		14
Total		80

Q:1 (points)

Q:2 (points) S

Q:3 (points)

Q:4 (12 points) Find the Fourier coefficient a_0 and a_n (where $f(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n cos\xi t + b_n sin\xi t; \xi = \frac{n\pi}{halfperiod}$) for the following function:

$$f(t) = \begin{cases} 0 & -\pi < t < 0 \\ \sin x & 0 < t < \pi. \end{cases}$$

Q:5 (14 points) Write the Fourier series in sine phase angle form:

$$f(t) = \pi - \frac{1}{\pi}\sum_{n=1}^{\infty}\frac{cos(2n-1)t}{(2n-1)}.$$

Q:6 (14 points) Find a particular solution of the ODE using complex Fourier series:

$$y'' + y = f(t) = \begin{cases} 1 & 0 < t < \pi \\ -1 & -\pi < t < 0. \end{cases}$$